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ABSTRACT

A construct validation of a modified version of a teacher efficiency scale was conducted to establish its use with preservice teachers. The scale adapted by A. E. Woolfolk and W. K. Hoy from one constructed by S. Gibson and M. H. Dembo, which contained 12 personal efficacy (PE) and 6 general teaching efficacy (TE) items, was further modified for preservice teachers and administered to 197 education majors from a summer term and 162 education majors from a fall term. Factor analysis and confirmatory factor analysis confirmed the two-factor solution, indicating that the construct is stable to modifications and generalizable to preservice teachers. Confirmatory factor analysis suggests that the model does not fit the data very well. Items on both subscales may need to be revised or eliminated. Five tables present study findings, including data on goodness of fit. (SLD)

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Teacher Efficacy and Preservice Teachers: A Construct Validation

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Teacher efficacy has been defined as a teacher's belief that his or her ability has a positive effect on student learning and is one of the few teacher characteristics consistently related to student achievement (Ashton, 1985). Other variables related to efficacy include student motivation, teachers' adoption of innovation, teachers' classroom management techniques, and ratings of teacher competence (Woolfolk & Hoy, 1990).

Gibson and Dembo (1984) identified two dimensions of efficacy, personal efficacy (PE) and teaching efficacy (TE). Personal efficacy represents the teacher's belief that he or she has the personal skills and abilities to influence student learning. Teacher efficacy, which represents more general beliefs about the relationship between teaching and learning, is characterized by the notion that a teacher's ability to bring about change is limited by factors external to the teacher, such as home environment, family background, and parental influences.

The relationship between efficacy and other variables warrants the examination of how efficacy develops and is measured in preservice teachers. Oneida (1989) examined preservice teachers at three intervals of a teacher education program and found that a high sense of efficacy begins early, as preservice teachers begin to develop teaching confidence and competency. Efficacy levels remained the same, however, from the start of student teaching through the beginning of the first year of teaching. This suggests that a sense of efficacy may vary at different stages of the teacher education continuum. While Narang (1990) found that beginning teachers have a positive perception of their teaching skills and strategies, Hoy and Woolfolk (1990) reported that this strong sense of personal efficacy is tempered by a decrease in general teaching efficacy after the completion of student teaching.

Purpose

The wording of conventional efficacy scales may not be suitable for use with preservice teachers. The purpose of this study was to conduct a construct validation of a modified version of a teacher efficacy scale, for specific use with preservice teachers.

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Using a sample of prospective teachers, Woolfolk and Hoy (1990) replicated the two-factor structure of efficacy. Woolfolk and Hoy used the original 16 items identified by Gibson and Dembo as well as 4 additional items of their own. Of the 20 total items, 12 items represented personal efficacy and 6 items represented general teaching efficacy. As is however, the wording of the PE items is expressed in a manner that assumes the respondent is currently teaching. In actuality, the teaching experience of preservice teachers may range from no experience to a myriad of informal and formal classroom practicum and internship experiences.

In this study the wording of the 12 PE items used by Woolfolk and Hoy were modified slightly so that the wording would be more consistent with the respondent's current situation as a preservice, rather than inservice, teacher. For example, the PE item "When I really try, I can get through to most difficult students" was modified to read "If I really try, I will be able to get through to most difficult students". It was expected that the two-factor structure would remain stable with the modified PE items. The eight items that represent teaching efficacy were not modified.

Method

Subjects. The data for this study were collected at a College of Education at a large metropolitan university during the summer and fall terms of 1992. Separate sets of data were collected during each term. During the summer term, 197 education majors enrolled in an undergraduate course in measurement for teachers participated in the study. During the fall term, 162 subjects participated. The course is required for all education majors regardless of their teaching field. While demographic variables were similar for both groups a notable difference may be that the first group was comprised of slightly more senior year students with more internship or practicum experience than the second group (see Table 1).

Procedure. The instrument was administered anonymously and voluntarily during regularly scheduled class sessions. The efficacy scale consisted of the 12 modified PE items and 8 unmodified TE items. Responses were along a 6-point Likert scale from "strongly disagree" to "strongly agree". In addition, the Crown-Marlowe Social Desirability Scale consisting of 33 true/false items was administered to determine the extent that efficacy responses might be contaminated by a social desirability response set.

Results: First Administration

Factor Analysis. Responses were submitted to principal axis factoring using PA2 extraction option of SPSS and varimax rotation. The two factor solution was confirmed. While the

pattern of factor loadings for nearly all items closely matched those of Woolfolk and Hoy, some unique differences occurred. Two modified PE statements, items 15 and 20, loaded almost identically on both factors (see Table 2). One statement on the unmodified TE scale, item 16, loaded equally low on both factors. In fact, in an analysis using a coefficient of .35 as the loading criteria, item 16 would not have been included on either factor (see Table 3).

Using LISREL 7, a confirmatory factor analysis (CFA) was conducted to examine the fit of the measurement model underlying the two-factor structure of teacher efficacy. The goodness-of-fit of the model was evaluated using several indices. The results indicated a lack of fit and that the measurement model should be rejected (see Table 4).

Reliability. The internal consistency of the two scales was estimated using Cronbach's alpha. The reliability coefficients were .65 for the unmodified TE scale and .79 for the modified PE scale.

Social Desirability. Pearson's correlation was calculated to determine whether participants responded to efficacy statements in a socially desirable manner. The correlation between the Crowne Marlow Scale of Social Desirability and TE was not significant ($r = .12$). While social desirability was significantly related to PE ($r=.27$, $p < .001$), the relationship is too weak to conclude that a socially desirable response set was present.

Results: Second Administration

Factor Analysis. Again using PA2 extraction option of SPSS and varimax rotation, the two factor solution was confirmed and the pattern of factor loadings for most items resembled that reported in the first administration. However, the two modified PE statements, items 15 and 20, which had problematic loadings previously, loaded convincingly on the PE scale in the second administration and is consistent with the loadings reported in the Woolfolk and Hoy study (see Table 2). Item 16, the unmodified statement on the TE scale which loaded equally low on both factors in the first administration, loaded unquestionably on the TE scale in the second administration, although the loading is still considerably low (see Table 3). The results of the second confirmatory factor analysis suggest that the measurement model was a slightly better fit than in the first administration, but like the first administration, the model does not fit the data very well (see Table 4).

Reliability & Social Desirability. The results were similar to the first administration. Cronbach's Alpha was .84 for the unmodified TE scale and .70 for the modified PE scale. The correlation between the Crowne Marlow Scale of Social

Desirability and TE was not significant (r = .10). Again, social desirability was significantly related to PE (r=.29, $p < .001$), but as in the first administration, the relationship is too weak to conclude that a socially desirable response set was present.

Discussion

Because of the link between efficacy and other variables, identifying an efficient simple structure for measuring the construct in preservice teachers is worthwhile. A limitation of research involving preservice teachers is that there is no clear consensus on what "preservice" means. The preservice time frame is identified anywhere along the continuum from first entering a college of education, typically the junior year, through the completion of student teaching. There is a myriad of practicum and internship experiences throughout this time period and as previous studies have indicated, efficacy appears developmental during the preservice period. The relationship between teacher efficacy and other variables may be influenced by the socialization effect of teaching experiences (Hoy & Woolfolk, 1990).

In this study, the two-factor structure of teacher efficacy was replicated, indicating that the construct is stable to modifications and is generalizable to preservice teachers. That some efficacy statements reacted differently in subsequent administrations might be indicative of the unique nature of the respondent. The second group of respondents contained proportionately more senior level students and students with practicum experience. If teaching efficacy is indeed developmental and if levels of efficacy are subject to change throughout the preservice teacher continuum, then one might expect scoring differences between the two groups. A comparison of mean scores for each subscale as well as Items 20, 16, and 15 reveals no substantive difference in scores (see Table 5). It is more likely that the problem lies with the model itself as indicated by the confirmatory factor analysis. Items on both subscales may need to be revised or eliminated in order to better fit the hypothesized model.

Several elements in the demographic data merit attention. Over half of respondents in each group reported that they have wanted to be a teacher since completing high school, many reporting that they have always wanted to teach. In addition, three-fourths of these preservice teachers stated that they plan to spend their entire career teaching. These results are interesting in light of the fact that as many as seven out of ten teachers leave the classroom before their tenth year of teaching. The need to develop and foster a sense of efficacy in preservice teachers may be an important factor in decreasing the drop-out rate of beginning teachers.

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Table 1
Demographic Variables for Summer and Fall Terms

	Summer Term (N=197)	Fall Term (N=162)
GENDER:		
Female	82%	81%
Male	18%	19%
RACE:		
White	87%	86%
Hispanic	7%	6%
Black	5%	5%
MAJOR AREA:		
Elementary Education	56%	36%
Secondary Education	30%	28%
Special Education	12%	28%
YEAR OF STUDY:		
Juniors	36%	50%
Seniors	63%	48%
PRACTICUM/INTERNSHIP EXPERIENCE:		
Yes	71%	50%
No	29%	49%
WHEN DID YOU DECIDE TO ENTER TEACHING:		
- Always wanted to teach	37%	35%
- After high school	17%	22%
- After starting college	18%	15%
- After completing basic studies (freshman and sophomore years)	20%	20%
- Not sure I want to teach	8%	8%
EXPECTED NUMBER OF YEARS TEACHING:		
- Plan to teach entire career	73%	76%
- Plan to teach 3 to 5 years	20%	16%
- Plan to teach 1 to 3 years	3%	4%
- Do not plan to teach	4%	4%

Table 2
Modified Personal Efficacy Items and
Factor Loadings for Personal and Teaching Efficacy

	Item	Summer Term PE	Summer Term TE	Fall Term PE	Fall Term TE
7.	If a student gets a better grade than he/she usually gets, it will be because I will have found better ways of teaching that student.	.71	.08	.59	.01
11.	If the grades of my students improve, it will usually be because I found more effective teaching approaches.	.70	.10	.52	.02
6.	If a student has difficulty with an assignment, I will be able to adjust it to his/her level.	.60	.15	.68	.07
8.	If I really try, I will be able to get through to most difficult students.	.53	.11	.64	.17
12.	If a student masters a new concept quickly, it might be because I will have known the necessary steps in teaching that concept.	.51	.11	.54	.01
5.	I will have enough training to deal with almost any learning problem.	.50	.17	.56	.10
18.	If I really try hard, I will be able to get through to even the most difficult or unmotivated students.	.40	.12	.58	.26
1.	If a student does better than usual, many times it will be because I will have exerted a little extra effort.	.39	.14	.36	.15
17.	If one of my students can't do a class assignment I will be able to accurately assess whether the assignment is at the correct level of difficulty.	.37	.15	.58	.06
14.	If a student does not remember information I gave in a previous lesson, I will know how to increase his/her retention in the next lesson.	.31	.02	.54	.09
20.	**My teacher training program and/or experience will give me the necessary skills to be an effective teacher.**	**.44**	**.42**	**.63**	**.12**
15.	**If a student in my class becomes disruptive and noisy, I will know some techniques to redirect him/her quickly.**	**.39**	**.37**	**.55**	**.00**

Table 3
Teaching Efficacy Items (Unmodified) and
Factor Loadings for Personal and Teaching Efficacy

	Item	Summer Term PE	Summer Term TE	Fall Term PE	Fall Term TE
19.	When it comes right down to it, a teacher really can't do much because most of a student's motivation and performance depends on his/her home environment.	.01	.65	.25	.72
9.	A teacher is very limited in what he/she can achieve because a student's home environment is a large influence on his/her achievement.	.01	.61	.04	.62
2.	The time spent in school has little influence on students compared to the influence of the home environment.	.06	.46	.00	.60
10.	Teachers are not a very powerful influence on student achievement when all factors are considered.	.15	.45	.18	.41
3.	The amount a student can learn is primarily related to family background.	.02	.40	.03	.51
13.	If parents would do more for their children, I could do more.	.16	.38	.25	.39
4.	If students aren't disciplined at home, they aren't likely to accept any discipline.	.09	.35	.01	.32
16.	**Even a teacher with good teaching abilities may not reach many students.**	**.13**	**.10**	**.07**	**.32**

Table 4
Goodness-of-Fit Indices for Confirmatory Factor Analysis

Index	Summer Term	Fall Term
Chi Square	419.21	324.35
Chi Square/df	2.48	1.92
Goodness-of-fit index	.80	.83
Adjusted goodness-of-fit index	.75	.79
Root mean square residual	.09	.09

Indicators of acceptable model fit:
1) The smaller the chi-square value the better the fit
2) Chi-square/df $\leq$ 3
3) Goodness-of-fit index > .90
4) Adjusted goodness-of-fit index > .90
5) Root mean square residual <.05

Note: Chi-square statistics are influenced by sample size. This is problematic since even small differences between the hypothesized model and observed data will result in statistically significant chi-square values. Alternative measures of fit, such as those provided, address this problem.

Table 5
Teacher and Personal Efficacy Mean Subscale and Item Scores

	TE	PE	Item 20	Item 16	Item 15
Summer Term					
Mean	26.76	43.64	3.92	3.04	4.25
SD	5.41	8.66	1.43	1.74	1.27
Fall Term					
Mean	26.62	44.73	4.14	2.69	4.51
SD	5.04	9.88	1.47	1.65	1.41